FECUNDITY IN EARLY NEW SOUTH WALES: AN EVALUATION OF AUSTRALIAN AND CALIFORNIAN EXPERIENCE

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DR. Kenneth Thompson's review of reports of extraordinary fecundity in early California[1] prompted us to examine similar observations made in relation to the first settlement in Australia, which was founded at Sydney Cove in the late 18th century. Accounts of enhanced fecundity or fertility* may prove to be a phenomenon common to colonization elsewhere. If so, pertinent differences in the backgrounds of Australian and California settlement might shed further light on the concept, and its genesis might emerge more clearly through an examination of the very earliest stages of settlement, particularly when some statistical data were available.

THE COLONY OF NEW SOUTH WALES AND THE QUALITATIVE EVIDENCE FOR ENHANCED FECUNDITY

The settlement at Sydney, Port Jackson, New South Wales, was established in January 1788 under Governor Arthur Phillip. The founding population consisted of approximately 750 convicts (including 188 females) and 200 civil and military personnel, with 40 wives, all of whom arrived on the First Fleet. There was no relevant contact with the small indigenous population. No change took place in

*Matthews Duncan, in 1868, was the first to clearly distinguish between these terms: fecundity means "the demonstrated capability to bear children," while fertility, which implies fecundity, "also introduces the idea of number of progeny."[2]

This project was supported in part by a grant to one of us (B.G.) from the Australian Research Grants Committee.

the female population—except for transfers to a small subsidiary settlement established at Norfolk Island some 900 miles to the east—until June 1790, when the *Lady Juliana* arrived with about 230 female convicts. Although some were said to be "loaded with the infirmities incident to old age,"[3] more than 90% were in the child-bearing age range of 15 to 45 years. During the next month, the Second Fleet—notorious for its high mortality on the voyage—landed about 750 convicts, of whom 67 were female. Again with the exception of transfers to Norfolk Island, the female population remained relatively static until the latter half of 1791 and early 1792, when the arrival of the Third Fleet and other ships added about 2,000 male and 218 female convicts. Late in 1792 two ships brought an additional 365 convicts, of whom 74 were women. Over the period from 1788 through 1792 only minor fluctuations occurred in the "free" (nonconvict) female population.

The first five years—indeed, in some respects the first 15 years—of the colony were a struggle for mere existence. Crops failed, gardens withered, livestock died or strayed, and vital stores and provisions which arrived from England at infrequent intervals were deficient in quality and quantity. Starvation was a recurring threat: indigenous food—plant, fish, and kangaroo—was limited and irregular in availability, so that the colony's nutritional status, basically dependent on salt meat and flour, was constantly impaired. Once the first high hopes for a new venture had died there were no enthusiastic accounts of the settlement's progress and prospects; only a few, notably Governor Phillip, retained any faith in its future.[4] In these circumstances no assessment of human fecundity could have been biassed by considerations of the fertility of the soil, the productivity of the region, or the multiplication of the imported livestock.

Even by 1812 the colony was not entirely self-supporting; some more arable country had been opened up with difficulty, but the settlers were not to escape into the rich pastoral lands beyond the formidable Blue Mountains for almost another five years. At this stage, a Select Committee of the British House of Commons inquiring into transportation possibly assumed a correlation between the fertility of man and of his environment, stating: "the soil and climate are described to be extremely fine, healthy, and productive."[5] No other reference of this kind has been found in the early literature relating to the colony.

The first authoritative observation on the subject is provided by the surgeon's mate of the *Sirius*, a naval vessel of the First Fleet, in 1791:[6]

> Our births have far exceeded our burials; and what is more remarkable, women who were supposed to be past child-bearing, and others who had not been pregnant for fifteen or sixteen years, have lately become mothers.

We have identified no similar observation in the diaries or correspondence of other doctors in the colony during its formative years, but a nurse-midwife and a good observer, Margaret Catchpole, a convict transported in 1801, noted that "it is a wonderfull Countrey for to have children in—very old women have them that never had won Before."[7]

In 1793 Captain Watkin Tench, an officer of the marines and a perceptive participant in the colony's first four years, amplifying the statement that "no climate, hitherto known, is more generally salubrious," remarked:[8]

> . . . to this cause, I ascribe the great number of births which happened, considering the age, and other circumstances, of many of the mothers. Women, who certainly would never have bred in any other climate, here produced as fine children as ever were born.

Similarly, John Hunter, a much-travelled naval captain of humanitarian outlook who was destined to become the colony's governor, observed:[9]

> I do not think I can give a stronger proof the salubrity of the climate than by observing that I never saw the constitution of the human race or any other animal, more prolific in any part of the world; two children at a birth is no uncommon thing, and elderly women, who have believed themselves long past the period of childbearing, have repeatedly had as fine, healthy, strong children as evere were seen.

Hunter was referring particularly to Norfolk Island, a more fertile place than Port Jackson, with which he was equally well acquainted. Although the prolific bird life and the island's produce saved Hunter and his associates from starvation during a stay of some 12 months beginning in March 1790, it is difficult to substantiate his impression of human fertility from the available data. Only 15 births occurred during the year among 100 women in the settlement and among another 150

women, mostly from the *Lady Juliana,* who were transferred from Sydney for the latter six months. The population of children increased from about 35 to 65 (a dozen or so probably arrived with the women), so that the proportion of children (almost all less than five years of age) to adult females fell from approximately 1:3 to 1:4.[10] After generous allowance for possible errors, these figures reflect an annual birth rate of less than 100 per 1,000 women, which is low by contemporary standards (see below). Possibly a more significant observation is that only one child had died since the island was settled in 1788.

Although not published until 1822, one account of remarkable fecundity dates back to the early years of settlement; it also includes a new hypothesis as to the cause. John Nicol, steward of the *Lady Juliana* in 1790, gives a colorful and detailed description of her voyage to Australia with some 220 of the lady convicts and of the Sydney scene:[11]

> They have an herb in the colony they call Sweet Tea. It is infused and drank like the China tea. . . . There was an old female convict, her hair quite grey with age, her face shrivelled, who was suckling a child she had born in the colony. Every one went to see her, and I among the rest. It was a strange sight, her hair was quite white. Her fecundity was ascribed to the sweet tea. I brought away with me two bags of it, as presents to my friends; but two of our men became very ill of the scurvy, and I allowed them the use of it, which soon cured them, but reduced my store. When we came to China I showed it to my Chinese friends, and they bought it with avidity, and importuned me for it. . . .

The vine *(Smilax glicyphylla)* is described as a "tolerably pleasant succedaneum" for China tea in the book published by the colony's surgeon-general, John White, where its leaves are also illustrated.[12] Denis Considen, one of White's assistants, wrote to Sir Joseph Banks of its antiscorbutic properties[13] and other "medical gentlemen" described it as a "powerful tonic,"[14] but a veil of professional secrecy appears to have been drawn over its efficacy in increasing fertility. Nicol's account has been quoted in full because, if it fails to establish a case for enhancing fertility, it does contain hints that the tea may have had aphrodisiac properties. Perhaps its continued use for a century and a half as "a sort of cure-all amongst the humblest class of inhabitants

. . . particularly favoured by old dames" lends support to this suggestion.[13] However, evidence from all sources uniformly supports the view that no aphrodisiacs were required by the early colonial girls; as an English neswpaper facetiously put it:[15]

> Governor Phillip finds great difficulty in the due appropriation of husbands. At first he allowed six to each wife; but at present the female convicts having very greatly increased, the number allotted to each is not more than three. This necessary regulation . . . has produced much animosity among the fair sex of the settlement.

A not entirely accurate description of the penal colony at Sydney published in François Péron's account of his voyage of discovery from 1800 to 1804 (first published in French in 1807), records that in their new environment the reformed *filles publiques* revealed the greatest fecundity, much greater than was to be expected in the previous state of debauchery.[16] At the same time, the relative infertility of the Sydney soil was acknowledged. In the English edition of 1809, and later in the second French edition of 1824, this isolated observation is considerably expanded:[17]

> The same [moral] revolution, effected by the same means, has taken place amongst the women: and those who were wretched prostitutes, have imperceptibly been brought to a regular mode of life, and now form intelligent and laborious mothers of families. Though it is not merely in the moral character of the women, that these important alterations are discoverable, but also in their physical condition, the results of which are worthy of consideration, both of the legislator and the philosopher.* For example, every body knows that the common women of great capitals, are in general unfruitful; at Petersburgh, and Madrid, at Paris, and London, pregnancy is a sort of phenomenon amongst persons of that description; though we are unable to assign any other cause, than a sort of insusceptibility of conception: the difficulty of researches, as to this subject, has prevented philosophers from determining how far this sterility ought to be attributed to the mode of life of such women; and to what degree it may be modified or altered, by a change of condition and manners. But both these problems are

*In the French edition of 1824 the word *médecin* is used.

> resolved, by what takes place in the singular establishment that we are describing. After residing a year or two at Port Jackson, most of the English prostitutes become remarkably fruitful; and what, in my opinion, clearly proves that the effect arises much less from the climate, than from the change of manners amongst the women, is, that those prostitutes in the colony, who are permitted by the police to continue in their immoral way of life, remain barren the same as in Europe. Hence we may be permitted to deduce the important physiological result, that an excess of sexual intercourse destroys the sensibility of the female organs, to such a degree, as to render them incapable of conception; while, to restore the frame to its pristine activity, nothing is necessary but to renounce those fatal excesses.

The second French edition was "revised, corrected and augmented" by L. de Freycinet, largely from earlier notes made by Péron; it seems likely that the paragraph may be attributed directly to Péron, a former student of medicine as well as a distinguished naturalist and anthropologist.

Thomas Reid, surgeon superintendent of convict transports, accepted the widely held view that excessive venery impaired fertility, but was less impressed with the moral reformation induced by the benevolent penal arm of British justice. Referring, with a characteristic polysyllabic prolixity, to "that deplorable state of habitual dissoluteness aggravated by heinous indulgence in open violation of decency," he states (1822):[18]

> The evil consequences to the colony from this abuse are innumerable. The continual disturbance of social connections, and disregard of moral obligation, are not its only bad effects; the great hope of colonization is defeated: population is undoubtedly checked in its advance by such pernicious practices. This fact is proved by the concurrent testimony of all nations, and various arguments have been urged in illustration. . . . In reply to this it may be said, that the population in New South Wales has increased in a ratio greatly beyond that of any other country. The extraordinary salubrity of the climate, and other circumstances, may have contributed in a great degree to that remarkable increase, which appears unquestionably without parallel even in the periods of American colonization; but were

> female virtue better protected, and cherished with becoming care, there can be not a shadow of doubt, that the population would be much greater than it is even now.

A critical, indeed an arrogant, medical gentleman from the Bengal Medical Society offered some peculiarly precise statistical information acquired on a brief tour undertaken for the sake of his health.[19]

> The effects of the climate of Australasia [which varies from temperate to tropical], it is well known, are to increase . . . the productive powers of animals of all descriptions . . . probably [in man] owing to the abundance of provision, in conjunction with the well known salubrity of the atmosphere. . . . Almost every woman, under 42 years of age, on her arrival in New South Wales, and properly treated [sic], will beget a large family, producing for a considerable period, a child once a year. Females of a higher class are less affected by the climate.

A measure of official corroboration of the birth of children to older women is found in the report of J. T. Bigge, a judge appointed to inquire into the state of the colony of New South Wales:[20]

> The effects of the licentiousness of the women at Parramatta are more visible in their appearance than in their health. I was much struck with this circumstance, at the first muster that I attended at Parramatta in the year 1819, when most of them were accompanied by fine and healthy children, some of whom had been born after their mothers had attained the age of 45.

In the short period here under review, instances of families of the remarkable size recorded in California cannot be anticipated, but the Reverend J. D. Lang mentions a convict couple from the First and Second Fleets who had seven or eight children.[21] As will appear, perhaps the more significant observation is that "all [of the children] . . . had arrived at manhood" for there were "no infantile diseases whatever" in the colony. Measles, whooping cough, chicken pox, scarlet fever, and smallpox were unknown, and tuberculosis, if endemic at all, was of negligible importance.[22]

The Australian evidence to suggest enhanced fecundity cited thus far resembles closely the Californian information, both in character and quality. Before comparing the experiences of the two colonies, and as a result offering a provisional explanation of the situation, we may

profitably examine the statistical data available for New South Wales.

Vital Statistics

For the period 1788 to 1792 inclusive, data on births and deaths in Sydney are considered reasonably accurate,[23] even though they are based chiefly on baptismal and burial records. The derived rates quoted below, although of the correct order of magnitude, should be considered as approximations. Some of the problems in determining rates for births and deaths have been examined more fully elsewhere.[24]

The ages are known for 122 of the 188 female convicts of the First Fleet; 114 of these were in the childbearing ages of 15 to 45 years.[25] After allowing for transfers to Norfolk Island, approximately 200 women, convict and free, may be accepted as having the potential for conception between January 1788 and June 1790. During this period of two and one half years there were 85 births, giving an annual birth rate of 170 per 1,000 females per annum. In the next 12 months, by June 1791 (prior to the arrival of the Third Fleet) there were 43 births in an estimated population of 300 women (possibly an overstimate), giving a birth rate of 143 per 1,000 females per annum. Births to the end of 1792 numbered 117 in an estimated at risk female population of about 400, or a rate of 195 per 1,000. In Norfolk Island for almost the full two years of 1790 and 1791 (a longer and more realistic period than that previously examined in relation to Captain Hunter's visit) an annual rate of 110 births per 1,000 females prevailed.[10]

For comparison, Coghlan, in a careful statistical study of the New South Wales birth rate in the second half of the 19th century,[26] calculated that for *married* women in New South Wales under the age of 45 the annual natality rate in 1861 was 341 per 1,000. As males outnumbered females by more than three to one between 1788 and 1792, and as there were 245 births during those years among approximately 200 women, more than 90% of whom were probably of an appropriate age, we may reasonably assume that most of the convict women were "married" (although relatively few were legally so). On this basis the annual natality rates noted above for this early period are certainly not high.

To compare these rates with conventional birth rates, it is reasonale to divide them by a factor of eight, on the assumption that 25% of a standard population with equal sex distribution would be females

of child-bearing age; it is obviously inappropriate to express the birth rate in terms of the actual settlement population with its excess of males and artificial age distribution. Acceptance of this approach permits the conclusion that an over-all birth rate of 25 per 1,000 might be guessed as an upper limit during the settlement's first five years. If it changed at all—there are limitations to the available information—the birth rate tended to fall during the next decade.[27] This birth rate seems unequivocally lower than that of 35 per 1,000, generally accepted for England at the end of the 18th century,[28] and which was certainly reached in both England and New South Wales by the middle of the 19th century. Only three sets of twins, the expected number, occurred among the 245 births.

As Thompson implied,[1] an impression of increased fertility would be conveyed to an observer by a high survival rate among the infants. There were only 77 deaths in childhood in New South Wales in the five years from 1788 to 1792, amounting to 31% of the total births; between 1789 and 1791, when epidemic dysentery was absent, the proportion of child deaths to births was only 21%. Deaths of those under one year of age totalled only about 20% of the births.[24] Thus, the infant mortality rate was probably less than half that of 18th century London.[29]

For whatever reason, the ratio of adult women to children fell from 5:1 at the foundation of the colony to 2:1 in 1795 and 1:1 in 1799, in spite of an increase in the female population. In only a little more than a year (1790-1791) the ratio at Norfolk Island fell from 1:4 to 1:2.7.[10] Thus, the proportion of children (most of whom would be under two years of age) rose at the Port Jackson settlement from about 4% of the total population in 1795 to about 17% in 1799. Such a rapid change, irrespective of the absolute figures, would create the impression of remarkable fecundity and fertility; the accompanying fact that an unusually high proportion of the women were of child-bearing age would easily escape notice. A superficial observer, particularly one of moralistic tendency, might also find support for this view in the low marriage rate[30] (about 2% of single women per annum at its lowest level, between 1798 and 1802),[31] the high illegitimacy rate (in the early 1800s two thirds of all children were illegtimate),[32] and an increasing number of orphans and abandoned children.

We have attempted to identify any births to women of relatively

advanced age. Seventeen female convicts in the First Fleet were recorded as being 35 years of age or more in 1787, and eight were already over 45 years. Five women, ranging in age from 36 to 40 years, had acquired husbands but had no recorded issue by 1880. If it be accepted that two children (by different fathers) born in 1789 and 1791 were more likely to be those of a Mary Harrison in her middle 20s than a woman of the same name in her late 30s, then only one of the older females had a child after her arrival: Ann Powell at the age of 39 years had a baby by a seaman in March 1791—a year too late to be the white-haired mother to whom Nicol refers. As far as we know, Maria Haynes, who married a marine, became the oldest First Fleet mother when she had her fifth child in the colony at the age of 44. Sarah Mitchell, of the *Lady Juliana*, gave birth to a daughter in 1792 when she was 42 years of age. Although at least three others from this ship married after the age of 40 (one at the age of 68), we have failed to establish that any woman of exceptional age proved unexpectedly fecund.

One other fragment of statistical information deserves mention: the Reverend Samuel Marsden, who took a special interest in sin, recorded that of 395 married women in the colony in 1806, 90 (23%), all formerly convicts, had had no children. The duration of the marriages is not stated, although the context implies a long enough period to merit the observation. During the same period, another record indicates that the average number of children born to convict mothers (married or unmarried) was 2.32, and to married free women 2.64.[33] Sixty years later Coghlan estimated that in New South Wales only 8% of women marrying at the age of 30 were childless after five years of marriage. J. Y. Simpson estimated in 1844 that 11% of Scottish marriages remained sterile after five years,[35] while a decade later Matthews Duncan's figure for marriages in Edinburgh and Glasgow of three years' duration was 15%.[36] In 1861, 19% of Scottish marriages of unstated duration were childless.[37] By any standards, then, the Australian figure is high. Venereal disease, as well as promiscuity, was present in the colony virtually from its inception,[38] and postgonococcal salpingitis, as well as malnutrition, may well have contributed to impaired reproductive capacity. We have found no allusion to abortion prior to 1832, and examination of female mortality reveals no evidence of its use in the early years of the settlement.

Toward a Comparison

If the qualitative evidence offered by Thompson[1] and ourselves is accepted at its face value, a comparison of the information from both sources is instructive. First, as a cause of increased fecundity, or an impression thereof, a high regional productivity or local soil fertility is excluded; the relevant area of Australia was barren and infertile by Californian standards. Second, diet and nutrition cannot be held responsible, for the early years of Australian settlement were years of semistarvation and malnutrition. Third, moral reformation of the women, associated with a reduction in promiscuity and excessive venery —so attractive to our professional ancestors as an explanation of physical and mental ills—cannot account for any increased reproductive return. By comparison with the Australian female convicts (perhaps 20% of whom had been prostitutes), the Californian women were surely ladies of impeccable respectability. In any case, there is little or no evidence that moral reformation was achieved by transportation to Sydney, a point on which Reid and most contemporary observers came nearer to the truth than did the French scientists. An equable climate with a relatively high proportion of sunshine hours and comfortable nocturnal temperatures remains a common factor in California and Sydney, and thus it is the most plausible of the explanations offered by early commentators. Indeed, a generation or two later, Coghlan concluded that a climatic influence was responsible for the demonstrably greater fecundity of Australian-born married women (of all ages) by comparison with English, Scottish, or Irish migrant women.[39] Prior to the decline in the birth rate in the later decades of the 19th century, the Australian-born women were also more fertile.[40]

Conclusion

The statistical data available for the formative years of settlement in Australia suggest that the birth rate was not high by contemporary standards, and no individual cases of childbirth at advanced ages have been identified, in spite of some dogmatic medical and lay reports. There is, therefore, no unequivocal evidence of increased fecundity. If the quantitative testimony of the Reverend Marsden (supported by the impressions of Péron and Reid) on the high proportion of childless marriages be admitted, some enhancement of fertility among the remainder is not excluded. A striking and rapid change in the age distribution of the

population is clearly demonstrable; this is attributable largely to a low infant-mortality rate. The swift increase in the number of young children relative to the adult population could scarcely fail to create the impression of heightened female reproductive powers (virility being accepted tacitly as a biological constant by all contemporary authorities). The early settlers in California probably provided a population structure resembling more closely that of the first Australian settlement than that of an old, established community, and so the same phenomenon may well have occurred. In terms of the age structure of the population, there is a further analogy in the middle of the 19th century, when gold discoveries produced an influx of young adults to both California and Australia. In the present context this analogy cannot be carried too far, because in Australia this last mass migration was quickly followed by a well-defined rise in the birth rate —to the remarkable peak of 40 per 1,000 in the early 1860s.[41]

To examine in detail the reasons for the different experiences of 1800 and 1860 is beyond our present scope, but it is relevant to note that the environmental circumstances were wholly different in the later period: the resources of established towns and pastoral industries were available, there was an adequate food supply, and the economic status of the community was better. The later migrants were basically healthier, but infant mortality did rise to more conventional levels as the acute infectious diseases and tuberculosis became endemic.

This comparison serves chiefly to indicate that an impression of enhanced fertility in a developing community may arise for a variety of reasons, and can be evaluated critically only if enough information exists to define both the community and its environment. Statistical explanations alone, however, are rarely altogether satisfying, and a sociological rationale should at least be sought for the first Australian settlement. In the early stages of the settlement the female convicts "lived in a state of total idleness,"[42] and many of the men were scarcely more industrious. In the knowledge that "the chastity of the female part of the settlement had never been . . . rigid,"[43] we were at first inclined to relate any apparent increase in fertility to a combination of leisure, laxity of morals, and perhaps the effects of Botany Bay sweet tea, but these features would seem less likely to explain the Californian experience.

Further research provided a more profound, as well as a more com-

prehensive, answer to the problem in the work of Peter Cunningham published in 1827. Cunningham, a naval surgeon of wide experience, gained an intimate knowledge of the colony as a settler and of its convict population as an efficient surgeon-superintendent of five ships of convicts. His essays, written with humour and insight, reveal a tolerance and understanding of human waywardness which is uncommon among his contemporaries. In endorsing his concept, we venture to transcribe not only the sentence which is relevant to the present problem but also the ancedotes so aptly illustrative of it:[31]

> The inauspicious issue of the experimental mission of the Twelve Apostles [A footnote states: Twelve *unfortunate girls*, who had been sent out by some religious society, to get either places or husbands in New South Wales. They were so named by the sailors.] some years back has, I fear, operated against future speculations of this kind; a goodly proportion of that chosen band having been found in a *matronly* way (hanging in a sort of sentimental love-trance round the necks of the sympathizing tars) by the reverend inspector who visited them on arrival, to certify as to their *high* state of *moral* improvement. . . . still the situation of these unfortunates must be *now* out of all comparison superior to their former debased condition in England; while the colony cannot but have profited by such an acquisition as twelve young healthy females, destined perhaps to become mothers of virtuous families, and thus to increase the amount of our industrious population. Their sudden prolifickness doubtless arises partly from change of climate producing a corresponding change in constitution, but may chiefly be ascribed to an alteration of *habits*. The same effect we see coming into play among the street-perambulators in England, since it became fashionable to renovate their constitutions by short sentences to wholesome prison diet, and the wholesome discipline of the treadmill. The *fruitful* effects of these measures most of the parishes frequented by such damsels can abundantly testify. The facetious clergyman of a manufacturing village in the North seemed to understand this matter also:—no illegitimate children had been for a long while forthcoming in the parish, till change of times caused a dispersion of the *manufacturing establishment*, when a sudden fecundity ensued. A

worthy elder, shocked at the scandal of such a numerous illegal progeny being all "on the stocks" at once, waited on his pastor to condole upon the subject, and take steps to avert, as he deemed it, the "increasing depravity",—but was checked by his reverend friend pulling him gently by the sleeve, and whispering in his ear, "No, no, James, no, no! instead of viewing such as tokens of *increasing depravity*, I hail them, James, as the first signs of *returning morality*. . . ." So we may say of our female exiled population; pointing to the fine and numerous families which they rear as triumphant proofs of their moral regeneration.

We trust that Cunningham's Law of Increasing Depravity and Returning Morality will be found equally applicable to other colonies where, as another Australian medical traveler observed, "the healthy aspects, blooming cheeks and expressive eyes of the young damsels . . . show that the soil is as well adapted for the development of female beauty as it is universally allowed to be for the growth of grain."[45]

Acknowledgments

We are indebted to Mrs. Sheila Simpson for her invaluable assistance, and to the trustees of the Mitchell Library, Sydney, Australia, for permission to study material in their custody.

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22. Wentworth, W. C.: *Statistical, Historical and Political Account of the Colony of New South Wales.* London, Cochrane and McCrone, 1834, p. 55; Cunningham, P.: *Two Years in New South Wales,* 2 vols. London, Colburn, 1827, vol. 2, p. 183; Gandevia, B.: The Medico-Historical Significance of Young and Developing Countries, Illustrated by Australian Experience. In: *Modern Methods in the History of Medicine,* Clarke, E., editor. London, Athlone Press, 1971, p. 75; Thomas, B. and Gandevia, B.: Dr. Francis Workman and the history of taking the cure for consumption in the colonies. *Med. J. Aust. 2*:1, 1959.
23. *Report from Select Committee,* op. cit., p. 9.
24. Gandevia, B. and Cobley, J.: Mortality at Sydney Cove, 1788-1792. *Aust. New Zeal. J. Med. 4*:111, 1974; Gandevia, B. and Gandevia, S.: Childhood mortality and its social background in the first settlement at Sydney Cove, 1788-1792. Submitted for publication. The figures used in the present essay are largely derived from these papers, in which the sources are more fully examined.
25. The ages are given by Cobley, J.: *The Crimes of the First Fleet Convicts.* Sydney, Angus and Robertson, 1970.
26. Coghlan, T. A.: *The Decline in the Birth Rate in New South Wales.* Sydney, Govt. Printer, 1903, p. 4. This paper is subtitled "An Essay in Statistics."
27. Dey, P. and Gandevia, B.: *Childhood Mortality and the Birth Rate in New*

South Wales, 1793-1800. In preparation.

28. The evidence is reviewed by McKeown, T. and Brown, R. G.: Medical evidence related to English population changes in the eighteenth century. *Pop. Studies 9:*119, 1955. See also Griffith, G. T.: *Population Problems of the Age of Malthus,* 2d ed. London, Cass. 1969, Introduction; Krause, J. T.: Changes in English fertility and mortality 1781-1850. *Econ. Hist. Rev. 52:*11, 1958. Krause indicates that in the absence of effective birth registration the ratio of children aged 0 to 4 years per 1,000 women of childbearing age is a measure of fertility. Without subscribing to this concept, we estimate through this method a ratio of 500 per 1,000 as a maximum for Sydney in 1793—more than 100 below the English figure for 1821.
29. Still, G. F.: *The History of Paediatrics.* London, Dawsons, 1965, pp. 445 and 379; Rendle-Short, M. and Rendle-Short, J.: *The Father of Child Care: Life of William Cadogan (1711-1797).* Bristol, Wright, 1966, pp. 39 and 28. See also McKeown and Brown, loc. cit.
30. Robson, L. L.: *The Convict Settlers of Australia.* Melbourne, Melbourne University Press, 1965, p. 141.
31. Calculations based on approximate figures from various sources suggest a decline from about 6.3 marriages per 100 unmarried females per annum between 1788 and 1792 to 1.6 in 1798-1802, followed by a rise to 5.3 in 1807-1810.
32. *Report from Select Committee,* op. cit., p. 12.
33. Marsden, S.: Essays concerning New South Wales 1807-1817, with a list of females in the colony. Mitchell Library, Sydney, Marsden papers. See also Sacleir, M.: Sam Marsden's colony: Notes on a manuscript in the Mitchell Library, Sydney. *J. Roy. Aust. Hist. Soc. 52:*94, 1966; and *Historical Records of New South Wales,* op. cit., vol. 6, p. 162.
34. Coghlan, op. cit., p. 18.
35. Simpson, J. Y.: On the alleged infecundity of females born co-twins with males: With some notes on the average proportion of marriage without issue in general society. *Edinburgh Med. Surg. J. 61:*107, 1844.
36. Duncan, op. cit., p. 186.
37. Census of Scotland, 1861: *Population Tables and Report.* Edinburgh, Secretary of State for the Home Department, Scotland, 1861, vol. 2, p. xxxvi.
38. Collins, op. cit., pp. 26, 446, and 596.
39. Coghlan, op. cit., p. 18 ff.
40. Coghlan, op. cit., p. 40 ff.
41. Cumpston, J. H. L.: Public health in Australia: Part III. Developments after 1850. *Med. J. Aust. 1:*679, 1931.
42. Tench, W.: *A Narrative of the Expedition to Botany Bay.* London, Debrett, 1793, p. 132. Major Robert Ross, when commandant of Norfolk Island, explicitly ordered that "for the further encouragement of such male convicts as are desirous to maintain the females, such females shall not be called upon by the public to do any work" except in special circumstances *(Historical Record of New South Wales,* op. cit., p. 447). Ross claimed to have made an effort to foster family life.
43. Collins, op. cit., p. 81.
44. Cunningham, op. cit., vol. 2, pp. 293-95.
45. Wilson, T. B.: *Narrative of a Voyage Round the World.* London, Dawson, 1968 (first published 1835), p. 297.